heat is absorbed in the process, then a rise in temperature would increase rather than decrease their stability.

On the other hand, the authors reason that the assumption of compounds between solute and solvent, or the assumption of solvates, is in full accord with the observations of Hartley, for not only would rise of temperature tend to dissociate the solvates—but so would increasing concentration of solute. Here again, and for the same reason, it would seem that the argument, though reasonable, is not absolutely convincing, for it is by no means certain that a rise of temperature always accompanies the formation of solvates.

Another method of attack adopted by the authors was to study the absorption spectra of solutions of salts in ether, acetone and alcohol, and in mixtures of these solvents with water. Many salts when dissolved in these non-aqueous solvents gave different absorption spectra for different salts of the same colored ion, but the spectrum of any one salt was different in different solvents. In mixtures of water with non-aqueous solvents, many salts, like neodymium chloride, for instance, showed no marked change in the spectrum when the amount of water was varied from 100 per cent. to 15 per cent. But as the amount of water was still further reduced, the spectrum was found to consist of a superposition of the spectrum of the aqueous upon that of the non-aqueous solution. Similarly, when praseodymium chloride was dissolved in mixtures of water and of ethyl or methyl alcohol the same sort of change was in general observed, except that in the alcoholic solutions there appeared an entirely new and very brilliant band in the ultra-violet, having no analog whatever in the spectrum of the aqueous solution. The conclusion is drawn that these facts and others of a similar nature are inexplicable on any other than the solvate theory of solutions—and further, that solvates of *both* undissociated molecules and of ions are formed. In the case of cobalt and copper salts, the authors conclude that a series of solvates of varying complexity are formed, while in the solutions of the rare earth which were studied there exists but a single solvate.

Finally it was observed that neodymium nitrate and neodymium chloride have very different spectra in concentrated aqueous solutions, and that on dilution, the spectrum of the chloride changes but slightly, while that of the nitrate changes considerably and becomes identical with that of the chloride. The authors explain this phenomenon as follows. The nitrate radical, consisting of twelve atoms, is very much more complicated than the chloride radical, and hence would affect the light vibrations of the neodymium atom to a much greater extent. The effect of increasing solvation would, on the one hand, be of less relative importance to the nitrate than the chloride molecule, and, on the other hand, the effect of dissociation, that is, the separation of the nitrate radical from the neodymium atom, would produce much greater changes in its absorption spectrum than the removal of the chloride or bromide ions.

It can be seen from this cursory review how promising and yet how difficult is this line of attack. With the splendid spectrophotographs furnished by this investigation as a guide, still more valuable results might be anticipated from an accurate spectrophotometric study of the same solutions. The above qualitative tests of the various theories might then be supplemented by strictly quantitative ones.

ARTHUR B. LAMB

The Genera of Fungi. By FREDERIC EDWARD CLEMENTS, Ph.D., Professor of Botany and Head of the Department of Botany in the University of Minnesota. Pp. iv + 227, octavo. Minneapolis, The H. W. Wilson Company. 1909. $2.00.

This long-expected key to Saccardo's "Sylloge Fungorum" has now appeared from the press, as a thinnish octavo volume, bound in plain green cloth. It is not so large as to be unhandy in the using, and yet it is large enough to secure that respect from librarians and library users that its usefulness demands. In the time that has elapsed since the publication of the mimeographed edition a couple of years ago, the author has enlarged its scope, so that now a number of things are included that were not found in the original work.

Thus while the book is still essentially a key to the Fungi in Saccardo, it covers also the Fungi in Rehm's "Discomyceten" and includes the families and genera of the lichens as treated in Engler and Prantl's "Pflanzenfamilien." This treatment of the lichens is in full accord with modern botanical ideas as given in the lecture rooms of our best botanists, and yet we imagine that many a conservative botanist will be somewhat taken aback when he finds how absolutely the line between "fungi" and "lichens" has been obliterated. Thus family 18 is *Sphaeriaceae* ("fungi"); family 19, *Verrucariaceae* ("lichens"); family 20, *Hypocreaceae* ("fungi"); family 21, *Dothidiaceae* ("fungi"); family 22, *Mycoporaceae* ("lichens"), and so on; while family 36, *Caliciaceae,* includes both "fungi" and "lichens."

The "Key to Orders and Families" (pp. 1–6) gives the plan of the book, the principal succession being *Phycomycetes, Ascomycetes, Basidiomycetes* and *Fungi Imperfecti.* The boundaries of the first of these are considerably enlarged by the inclusion of the Bacteria (five families) and the Myxobacteria (one family). In the treatment of the remaining families of *Phycomycetes* they are very properly regarded as degenerated *Chlorophyceae;* so we find brief characterizations of such algal orders as *Protococcales, Spirogyrales, Vaucheriales* and *Confervales.* We imagine that some fungologists of the old school will be distinctly shocked by this close association of fungi and algae. The inclusion of *Uredinales* (*Uredinaceae* and *Ustilaginaceae*) in the *Ascomycetes,* while very acceptable to the writer of this notice, will be frowned upon by many botanists who prefer to regard them as in some way entitled to admission to the *Basidiomycetes.* These examples may serve to show that the author of the book has succeeded in putting into it some of his ideas as to relationship, which must add much to the interest as well as the usefulness of the work, especially in the hands of advanced students.

The "Guide to the Volumes of Saccardo's Sylloge Fungorum" near the end of the book will prove very helpful to every user of the many-volumed work. Likewise the alphabetical index to the families in Saccardo's Sylloge Fungorum, and Rehm's Discomyceten will be of the highest value to the mycological student. Nor must be omit reference to the glossary of Latin and English terms which will help many a student who is rusty in his Latin to "dig out" the descriptions in Saccardo.

In his preface, the author says: "No attempt has been made to revise the genera, except where the treatment had lagged behind current practise, as is particularly true of the lichens." And again: "Questions of nomenclature have necessarily been left largely to one side, but no hesitation has been felt in making certain corrections. These have dealt mostly with mistaken or neglected transliteration, and with faulty composition." Still again, "A considerable number of sesquipedalian words have been shortened and the greater number of hybrid names have been corrected."

The last quotation which we make is one that should be read by every student of the fungi—"The mycologist must have a fair equipment of technical terms, as well as a Latin vocabulary, and the sooner these are acquired the better."

The book must at once become indispensable in every botanical library, and no doubt will be in demand by every mycologist who has access to Saccardo and Rehm. Moreover, it will not take long for the student of the fungi to find that he can identify his fungi so far as genera are concerned, by means of this handy little book.

Charles E. Bessey
The University of Nebraska

Scientific Journals and Articles

The closing (October) number of Volume 10 of the *Transactions of the American Mathematical Society* contains the following papers:

C. N. Moore: "The summability of the developments in Bessel functions, with applications."

G. D. Birkhoff: "Singular points of ordinary linear differential equations."

G. A. Miller: "Automorphisms of order two."